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EFFECT OF EXCHANGE RATES ON THE DEMAND FOR MONEY: (A STUDY OF SELECTED DEVELOPING COUNTRIES)

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ABSTRACT

The purpose of this paper is to investigate the effect of exchange rate on money demand in selected developing countries, over the period 1999-2010 using panel data approach. Results indicate that the exchange rate has a negative and significant effect on demand for money in selected countries. On the other hand, the effect of per capita income on demand for money in these countries is positive and significant as well but the effect of interest rate on demand for money is not significant.

Keywords: Exchange Rate, Demand for Money, Panel data, Developing Countries

INTRODUCTION

Money demand and the factors affecting the demand function play a decisive role in the analysis of macroeconomic and monetary policy by the monetary authorities of a country. Evaluation of demand for money can be used as an important factor to analyze the economic situation of that country. Increase in money demand reflects improved economic condition and decreasing demand for money reflects the poor economic condition in a country. Many variables affect the demand for money including interest rates, income, exchange rates, etc. Exchange rate devaluation increases the demand for money (Berument and Dogan, 2003). The currency devaluation in a country (for example Rials in Iran) against other currencies leads to reduced imports and increased exports in that country. Because after this devaluation the value of foreign products would be relatively expensive for domestic consumers and domestic products to foreign consumers will be cheap as well. For example, a rise in the value of US dollar from 1000 USD to 1100 USD causes a 10 percent increase in the price of foreign goods that are bought with a given price in Iran. Thus, it would be more affordable for people to buy similar domestic goods and domestic producers automatically are encouraged to increase their production and exports. Therefore, the currency devaluation leads to economic growth and reduces the unemployment and inflation. But the issue is not that simple because the structures and the possibility of domestic production of goods and services and the composition of exports and imports directly depend on other government policies. Romer (1993) expressed some theoretical reasoning behind the difference between closed and open economy about the inflationary effects of this phenomenon. After the devaluation of the currency, the demand for increased wages in an open economy would be relatively higher than a closed economy. The reason is that in an open economy changes in the value of domestic currency would affect the production factors of more seriously. Thus, increasing in the volume of money is reflected in the prices than in production. This fact will be reversed for a closed economy. In this process, the exchange rate operates as a key transmitter of money changes on economic activity. In addition, except the exchange rate other channels like interest rates and asset prices are also included. Dennis (2002) on the side of financial variables concludes the exchange rate as a key variable in changes of demand for money in small economies. A change in exchange rates directly affects the domestic price of tradable goods and reduces this price. It also increases the price of imported goods, the price index of consumer goods and services and finally the production cost of firms. But the overall net effect of exchange rate on the demand for money is ambiguous. So far there is no study on a large sample size to evaluate the effect of exchange rates on the demand for money. Therefore, the purpose of this paper is to investigate the effect of exchange rate on money demand in selected developing countries, over the period 1999- 2010 using panel data approach.

Research Article

Literature

During last decades, money demand theory has been discussed of various viewpoints which will mention to some of them in the following. Thus, many of the applied studies about money demand theory have been conducted in various countries. A large group of studies refer to the estimation of money demand functions of different countries. Important explanatory variables are identified in the demand function and their associated coefficients have been estimated for many countries. The main difference among these studies is in the type of selected variables or the method of estimation. Some of more important studies about the money demand theory are reviewed in the following. The literature on money demand has been expanded during decades with a great depth and prominent economists in this field have published their theories in the form of books and many papers. Some associated the money demand with prices level and transaction volume. Others concluded the velocity of money in equations. Some others related the money demand with utility derived from holding money. A group of scholars believed that demand for money is associated with the price level and income and paid their attention to factors influencing velocity of money. Keynes's theory of regressive expectations for money demand described three main factors named transaction, precautionary and speculative motives. Baumol (1952) have used the inventory theory and introduced the money demand function by minimizing the cost of portfolio to the volume of money (sum of the opportunity cost of holding money and bonds). The portfolio approach of Tobin (1958) explains that individuals hold their wealth as a combination of assets that have different risks and returns. Tobin clearly concluded the risk factor to money demand function and he believed that an individual can select a combination of risk-return (Linder, 1985). Some others believed that general price level, bond return rates, individual tastes, preferences and expectations about future are among factors affecting the individual's decisions to divide their assets between money and other assets. From Mandel's perspective (1963) one of the most important variables that can affect the demand for money is the exchange rate. Foreign securities and foreign currency are of assets that exist in individual's portfolio. Weakening or augmentation of domestic currency value changes the prices of these assets and thus lead to changes in demand for the domestic currency. Therefore, in this study, the exchange rate variable was considered in estimating the money demand function. The positive or negative relationship between the exchange rate and money demand refers to the wealth effect and substitution effects. Arango and Nadiri (1981) believe that with the increase of the exchange rate (devaluations), the value of foreign assets in terms of the domestic currency increases as well. The individual wealth increases and correspondingly his demand for money increases. However, the substitution effect causes an increase in the exchange rate and individuals predict a further depreciation in the domestic currency. Therefore, they may increase their demand for foreign currency and hold less domestic currency. If the substitution effect dominates the wealth effect, with increasing of the exchange rate the demand for domestic currency decreases. Due to the presence of an active exchange market in Iran, in this paper the black market exchange rate (Free Market) was used to estimate the money demand function. Dreger et al (2006) examined the effect of exchange rates on money demand in ten member countries of European Union using panel data approach. The results indicated that the sudden transformation in the currency of countries that had recently joined the euro caused an unstable demand for money in European Union member countries. Azim et al (2010) estimated the demand for money in Pakistan. The results showed that inflation and per capita income have a positive effect on the demand for money however the exchange rate had a negative impact on the demand for money. Deharmadsa and Nakinishi (2013) estimated the demand for money in Sri Lanka during the period 1978-2010 using an error correction model. The results showed that the exchange rate, inflation, interest rates, domestic and foreign interest rates are the most significant factors that influence the demand for money in Sri Lanka.

Several studies have been conducted on the money demand function in Iran. Nofaresti (1994) examined the effect of exchange rate changes and inflation on money demand for the period 1959-1992 using a partial adjustment model. To investigate the structural changes of money demand function during Islamic

Research Article

revolution the corresponding period was divided into sub-period namely before revolution and after revolution. Estimation outcomes showed that changes in interest rates of long-term bank deposits hadn't a tangible effect on money demand in the studied model. Results of the Chow test also indicated that no structural change has occurred in independent variables of money demand pattern.

Pesaran (1999) investigate the structural changes in demand for money in Iran after the Islamic revolution using an ARDL model. Results of the study showed that the revolution has caused structural changes in the money demand function. Also, The long-run elasticity of money demand for the production has decreased significantly after the revolution than before the revolution.

Bahmani Oskooee (2001) using a "Johansen Juselius co-integration" method for the period 1959-1990 indicated that in there is a long-run equilibrium relationship among M_2 GDP, inflation rate and exchange rate in the black market.

METHODOLOGY

This paper is a practical study from the viewpoint of purpose and from the viewpoint of data collection and the nature of the subject is considered as an analytic cross - sectional study. When we use the panel data approach we have to do a variety of tests to detect the proper estimation method. The most common tests used in this regard are the Chow and Hausman tests. The Chow test is used to make distinction between Ordinary Least Squares (OLS) and fixed effects models.

Model specification and research data

The model used in this study is as follows. This model is adapted from the study of Dreger et al (2010).

$$LM_2 = \beta_1 + \beta_2 Lrate_{it} + \beta_3 LExch_{it} + \beta_4 LY_{it} + \beta_5 LM_{2t-1} + u_{it}$$

$$i = 1, 2, \dots, N$$

$$t = 1, 2, \dots, T$$

Where M_2 is the demand for money i th country in year t , rate is the interest rate for money i th country in year t , Exch shows the official exchange rate for i th country in year t , Y is income per capita for i th country in year t . M_2 $t-1$ represents the money demand lag for the i th country in year $t-1$, respectively. All variables are transformed into logarithmic form. Data gathered from World Bank organization data bank (www.worldbank.org).

The random sample is made of 40 developing countries and that the maximum available data for the period 2010-2001 is used to estimate the model.

Quantitative results of stationary tests

First of all, we should test the stationary of variables. For this purpose, we used Levine and Lean (LL) and Im, Pesaran and Shin (IPS) tests were conducted. Results of the stationary test are represented in Table 1

Table 1: Results of the Levine and Lean and the Chow tests (level)

| Stationary / non-stationary | probability | Test statistic | Assessment method | variable | |
|-----------------------------|-------------|----------------|--------------------|----------|-------|
| stationary | 0.002 | -2.77 | constant | M_2 | level |
| | 0.000 | 1.02 | Constant and Trend | | |
| stationary | 0.000 | -7.35 | constant | Exch | |
| | 0.000 | -73.31 | Constant and Trend | | |
| stationary | 0.004 | -2.62 | constant | R | |
| | 0.000 | -5.27 | Constant and Trend | | |
| stationary | 0.67 | 0.46 | constant | Y | |
| | 0.000 | -9.21 | Constant and Trend | | |

Source: research results

Research Article

According to the results presented in table 1 and Levine and Lean tests, all variables are stationary at level. To ensure the obtained results from the LL, results of the stationary tests using Im, Pesaran and Shin method are presented in Table 2.

Table 1: Results of the Im, Pesaran and Shin tests (level)

| Stationary or non-stationary | Probability | Test statistic | Assessment method | variable | |
|------------------------------|-------------|----------------|--------------------|----------------|-------|
| Non-stationary | 0.108 | -1.23 | Constant | M ₂ | level |
| | 0.73 | 0.61 | Constant and trend | | |
| Stationary | 0.000 | -6.09 | Constant | Exch | |
| | 0.000 | -17.46 | Constant and trend | | |
| Non-stationary | 0.86 | 1.08 | Constant | R | |
| | 0.32 | -.45 | Constant and trend | | |
| Stationary | 1.00 | 5.45 | Constant | Y | |
| | 0.15 | -1.03 | Constant and trend | | |

Source: research results

According to the presented results in Table 2, M₂ and R variables are non-stationary but Y and Exch variables are stationary at level. Due to the Im, Pesaran and Shin test the first difference of M₂ and R will be stationary.

Table 2: Results of the Im, Pesaran and Shin test for stationary of variables (first difference)

| Stationary / non-stationary | probability | Test statistic | Assessment method | Variable | |
|-----------------------------|-------------|----------------|--------------------|----------------|-------|
| Stationary | 0.000 | -5.94 | Constant | M ₂ | level |
| | 0.002 | -2.8 | Constant and Trend | | |
| Stationary | 0.000 | -3.59 | Constant | R | |
| | 0.032 | -0.27 | Constant and Trend | | |

Source: research results

Since according to the Im, Pesaran and Shin test some variables stationary and some are non-stationary, it is necessary to perform a co-integration test to avoid a spurious regression. In this study we used the Pedroni test to examine co-integration among variables. Results of the Pedroni co-integration test using individual and group ADF and PP statistics are presented in Table 4.

Table 4: Results of Pedroni Co-Integration Test

| probability | Panel | Probability | Group | Test |
|-------------|-------|-------------|--------|---------------|
| 0.000 | -3.48 | 0.000 | -12.41 | PP statistic |
| 0.000 | -2.24 | 0.000 | 0.27 | ADF statistic |

Source: research results

Represented results in Table 7 show that according to the ADF and PP statistics the co-integration relation exists among study variables. Therefore, it can be said that there is a long-run equilibrium relationship between money demand and independent variables. After ensuring the existence of co-integration relationship it is required to determine the method of panel data estimation.

RESULTS OF DIAGNOSTIC TESTS

Due to the characteristics of the applied information that concludes both time series and cross-sectional data in many economic studies the panel data approach has been used for analysis. Using panel data approach has various advantages. This technique allows us to include effects of omitted variables which

Research Article

have continuity over time in the regression model. In the context of panel data approach we can eliminate the invisible effects of heterogeneous regression. One of the questions that must be answered based on this approach is the type of selected model. To test the accuracy and the strengths of different models various tests are used. The most common tests used in panel data approach are Hausman and Chow tests. The Chow and Hausmantests can be done in Eviews 6 software. Chow test is used to select between the least square and the panel data estimations. In this test the H0 hypothesis represents the aggregated least squares method and the hypothesis H1 represents the fixed effect approach. Fixed effects approach is acceptable when the difference between sections can be explained by intercept terms. But aggregated least squares method uses similar intercept terms. If the H0 hypothesis was rejected, the Hausman test is used to select the appropriate model. Hausman test is based on the presence or absence of a correlation between the estimated regression error and the independent variables of model. If this relationship exists fixed effects model is used and if the relationship does not exist, the random effects model should be used. The H0 hypothesis indicates the lack of correlation between independent variables and the error term and hypothesis H1 indicates the existence of this relationship. However, if the number of periods is less than the number of estimated coefficients in the model, the random effects model can't be used. In this study the diagnostic tests were done at each stage and appropriate model was chosen based on the results. Also, Due to the lack of some statistical data for variables in some periods using the unbalanced approach was inevitable. To estimate the model using diagnostic tests (Chow and Hausman) the type of the model is chosen. For the Chow test the fixed effect model was estimated. Then, performing the Chow test, due to the Limer statistic aggregated least squares method was rejected. Test results are summarized in Table 5.

Table 5: Results of the chow test for using fixed effect or panel data method

| Result | Significance level | Calculated F statistic | Fixed effect test (Chow) |
|-------------------------|--------------------|------------------------|--------------------------|
| H ₀ rejected | 0.0000 | 135.51 | |

Resource: research results

In order to perform the Hausman test, first, we estimate the random effects model. Hausman test results are presented in Table 6 that confirm the use of fixed effects against the random effect.

Table 6: Results of the Hausman test for choosing between fixed effects or random effects model

| Result | Significance level | Calculated F statistic | Haus man test |
|-------------------------|--------------------|------------------------|---------------|
| H ₀ rejected | 0.002 | 14.04 | |

Source: research results

Results of estimation using fixed effects method are presented in Table 7.

Table 7: Results of estimating the model for M₂ as dependent variable

| P-value | T-statistic | coefficient | Explanatory variable |
|-----------------------|-------------|-----------------------------|----------------------|
| 0.0008 | -3.39 | -0.09 | Exch |
| 0.271 | -1.31 | -0.012 | R |
| 0.009 | 2.62 | 0.077 | Y |
| 0.022 | 2.29 | 0.61 | M ₂ (-1) |
| 0.000 | 30.10 | -2.37 | C |
| R ² = 0.99 | | Prob (F-statistic) = 0.0000 | |

Source: research results

Individuals and firms can always encounter with unexpected incidents and events whether pleasant or unpleasant which require payments. Therefore a part of demand for money is affected by unpredictable factors and is a function of national income. As the level of national income increase the demand for money increases as well. According to table 7 the sign of GDP is positive and statistically significant. As

Research Article

the logarithmic form of variables is used this coefficient can be interpreted as elasticity. In other words, the elasticity of demand for money relative to income is equal to 0.077. However, this value is quite low but it is statistically significant. It means that a 100% increase in per capita income causes a 0.077 increase in demand for money. The sign of lag logarithmic coefficient of dependent variable in studied money demand function is positive which is consistent with traditional and money substitution effect theories. It shows that the domestic demand for money in any period depends on the money demand in the previous periods. The elasticity of demand for money to its previous lag is equal to 0.61 which is quite high and it is significant in 1% level of significance. Due to other results of the study the interest rate hadn't a significant effect on demand for money in the studied countries. In other words, the interest rate is not a determinant factor of money demand in these countries. The non-significance of the interest rates in developing countries can be attributed to the dependence of banking systems in developing countries and prescribed interest rates are determined independent from the demand for money.

Conclusion

The purpose of this paper is to investigate the effect of exchange rate on money demand in selected developing countries, over the period 1999- 2010 using panel data approach. First of all to avoid spurious regression unit root and co-integration tests were conducted and after ensuring of the existence of long run relation among variables, the diagnostic tests in panel data including Chow and Hausman tests were conducted. Finally, the fixed effect model was estimated and the following results were obtained:

The coefficient of exchange rate is negative and statistically significant. In other words, in developing countries the substitution effect of exchange rate exists. In other words, the elasticity of demand for money relative to income is equal to 0.077. However, this value is quite low but it is statistically significant. It means that a 100% increase in per capita income causes a 0.077 increase in demand for money. The elasticity of demand for money to its previous lag is equal to 0.61 which is quite high and it is significant in 1% level of significance. Due to other results of the study the interest rate hadn't a significant effect on demand for money in the developing countries.

REFERENCES

- Bahmani-Oskooee, Mohsen and Reymond Chi-Wing Ng (2002).** «Long-Run Demand for Money in Hong Kong, An Application of the ARDL Model», *International Journal of Business and Economics*, Vol.1,no.2, pp.147-155.
- Baumol, W. J, (1952).** "The Transactions Demand for Cash: An Inventory Theoretic Approach." *Quarterly Journal of Economics*, Vol. 66.
- Champika, Dharmadasa; Makoto, Nakanishi(2013).** 3rd International Conference on Humanities, Geography and Economics (ICHGE'2013) January 4-5, 2013 Bali (Indonesia).
- Dreger, C. and H. E. Reimers, and B. Roffia, (2006).** "Long Run Money Demand in the New EU Member States with Exchange Rate Effects." *IMF Working Paper. European Central Bank*. No. 628. www.ecb.int.
- Kao, C. (1999).** "Spurious Regression and Residual Based Test for Cointegration in Panel Data" *Journal of Econometrics* 90, pp. 1-44.
- Mundell, R. A, (1963).** "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates." *Canadian Journal of Economics and Political Science*, Vol. 24, No. 4.
- Pedroni, P. (1999).** "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors". *Oxford Bulletin of Economics and Statistics*, Special Issue, pp. 653-670.
- ParvezAzim, NisarAhmed,SamiUllah,Bedi-uz-Zaman.MuhammadZakaria (2010).** Demand for Money in Pakistan: an Ardle approach, *Global Journal of Management and Business Research* Vol. 10 Issue 9, :72-78.
- Tobin, J, (1956).** "The Interest-Elasticity of Transactions Demand for Cash." *The Review of Economics and Statistics*, No. 38.